

X.—*Observations on a Disease, the production of a Fungus, occurring in the Lettuce and other Vegetables.* By ARTHUR HILL HASSALL, Esq.

THE production of diseases through the agency of Fungi, whether in the animal or vegetable fabric, has not hitherto received that degree of consideration to which the frequency of their occurrence and the importance of the subject so eminently entitle them.

While walking in the garden this evening, I was particularly struck with the appearance of some of the lettuces contained in a fine bed of that vegetable, several of them having become wrinkled and discoloured, although a few days previously I had especially remarked their healthy and vigorous growth.

On examining several of the affected plants I found a considerable softening of the stem near the ground, and which, my mind having been previously prepared for such a phænomenon by my investigations respecting the decay of fruit, I did not hesitate at once to attribute to the action of a fungus,—a conclusion which was confirmed by a microscopic examination of the stem, by which the thalli or root-like filaments of the fungus were detected without difficulty.

In one of my papers on the Decay of Fruit, read before the Microscopical Society of London, I stated that if apples were inoculated with the thallus or sporules of fungi while still maintaining a firm connexion with the parent tree, nevertheless that they became affected with decay; and from the result of this experiment I concluded that the development of the fungi was the *cause* and not the *effect* of the decomposition, a fact which I conceive to be incontrovertibly established; and in confirmation of which, if any further evidence were needed, the present example of the independent operation of fungi would afford that additional evidence; for of the healthy condition of the lettuces prior to the attack of the fungi no doubt could be entertained, this being abundantly testified by the appearance of the unaffected plants.

That this disease is communicable by inoculation in the same way as the similar affection occurring in fruit I cannot doubt; I will however make the trial and communicate the result in a note to this paper.

Were the example which I have now recorded of disease in vegetables, the product of the operation of fungi, an isolated one, it would still be possessed of considerable interest; but so far from this being the case, I have not the least hesitation in asserting, that the majority, if not the entire, of culinary as well as ornamental plants are subject to a similar fatal disorder. Amongst the former class I would particularly mention the following, in all of which I have noticed the peculiar softening observed in the stem of the lettuce:—endive, cclery, potatoe, cabbage, pea, bean,

turnep, radish, parsnep, carrot, cucumber, and other cucurbitaceous plants.

The productions most liable to this fungoid disease would appear to be the more succulent kinds, and this fact accounts for the greater frequency of the disease in damp seasons.

Cheshunt, June 9th, 1843.

Note, July 17th.—The same evening on which I noticed the disease in the lettuce, I introduced the filaments of the fungi into numerous unaffected lettuces in different stages of growth and widely separated from each other, and in a few days I had the satisfaction, which I anticipated, of beholding the complete and perfect success of the experiment, and finally, the destruction of all the plants inoculated.

Encouraged by the marked success which attended the inoculation of the lettuces, I determined to treat in a similar manner vegetables of different kinds, feeling however considerable doubt as to the issue of this new experiment. I therefore inoculated the stems and seed-vessels of beans and peas, the stem and tuber of the potatoe, the top root of the turnep, leaves of rhubarb, and stem and leaves of the cabbage. At the same time I inoculated also the but little developed fruit of the apple, peach and gooseberry. Now a result no less satisfactory than in the previous case followed the inoculation of the productions above enumerated, differing from each other too as many of these do so widely in texture and affinities, the progress of the ravages of the fungi being however greatly modified by the condition as to density of the vegetable, or portion of the vegetable operated upon. Thus, their devastating progress in the tuber of the potatoe, in the top root of the turnep, and in the seed-vessel of the bean was very rapid, as might have been expected, since these consist almost entirely of loose cellular tissue and fluid which could offer but little resistance to the extension of the fungi; while in the stems of the potatoe, bean and pea, the progress was much slower, owing solely to the greater density of the parts.

The singular fact of the rapid development of fungi when introduced into the living vegetable economy, materially affects the views generally entertained as to the office and power of fungi in creation.

One of the greatest peculiarities of the fungi consists in the preference which they manifest for organic matter in a concentrated form. But it has hitherto been supposed that their powers were confined to dead organic matter* which they speedily de-

* This statement is by no means correct; the researches of Ehrenberg, Meyen, and many other physiologists have long since proved the falsity of this now antiquated notion. The inoculation of sound fruit with fungi was made so far back as 1819 by Prof. Ehrenberg. See his memoir 'De Mycetogenesi epistola,' Nova Act. Nat. Cur. vol. x.—ED.

compose, assimilate and remove from the fair face of Nature, and hence they have earned the not inappropriate, though inelegant, appellation of "Nature's scavengers." This however is taking but a very limited view of the powers and operation of fungi, since the present inquiry proves that they have the ability to invade and destroy the living vegetable fabric, and perhaps animal too; and this not merely while the vegetable is in a living state, but while the functions of its life are in full and healthy operation. Thus, in the operation of the fungi, as in most things, there is, as regards man's welfare, a mixture of good and evil, of benefit and disservice; the good result accruing to man, however, far outbalancing the evil.

Inquiries such as the present are peculiarly interesting, not merely from their value in a scientific point of view, but from the hope which they carry with them, amounting in this case almost to a conviction, that ultimately they will be attended with practical results. I hope that at no distant day a remedy will be found for some of the evils occasionally resulting to the vegetable world through the instrumentality of fungi.

XI.—*On two new species of British Jungermannia*. By THOMAS TAYLOR, M.D., Dunkerron, Kenmare*.

JUNGERMANNIA RIPARIA, MSS. T. T. Caule procumbente, subramoso; foliis subapproximatis, amplexicaulibus, oblongo-orbiculatis, concavis, integerrimis: fructu terminali; calycibus obovatis, apice plicatis.

Jung. pumila, Lind. Syn. Hep. p. 69. t. 2. (nec *Witheringii*).

Ad rivulorum umbrosorum ripas saxosas Hiberniæ, Britannicæ atque Germaniæ.

Caules procumbentes ramosi, subimplexi atque subcespitosi, 1—2 unciales, luride virides. *Folia* subimbricata, basi amplexicaulia, concava subrotunda aut parum elongata, patula, integerrima, cellulis majoribus. *Perichætialia* majora, calycis dimidium inferius tegentia. *Calyces* obovati seu oblongi, juniores etiam obtusi, apice plicati, plicis sæpius octo. *Pedicellus* semiuncialis. *Capsula* oblonga, quadrivalvis. *Perigonium* in rami medio sita vidi, ex foliis paucis, adpressis, basi ventricosis, antheram solitariam tenentibus conflata.

It is probable that the present species is extremely common, and that it has long been confounded by others, as well as certainly by myself, with *Jung. pumila*, With. The specimen collected by me in the river Dayle in 1813, and quoted under *J. pumila* in 'The British *Jungermannia*,' belongs to the present. It has been gathered long ago and carefully laid aside for further examination by Dr. Greville: his specimens are from Breadalbane. Again, Mr. William Wilson found the plant near Bangor Ferry in

* Read before the Botanical Society of Edinburgh.